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=> s (lithium battery) and ((copper or Cu) alloy))

MISSING OPERATOR CU) ALLOY

The search profile that was entered contains terms or nested terms that are not separated by a logical operator.

=> s lithium battery

302399 LITHIUM

120139 BATTERY

L1 15456 LITHIUM BATTERY

(LITHIUM(W) BATTERY)

=> s l1 and (copper alloy)

874713 COPPER

647345 ALLOY

32362 COPPER ALLOY

(COPPER(W) ALLOY)

L2 38 L1 AND (COPPER ALLOY)

=> s l1 and (Cu alloy)

795653 CU

647345 ALLOY

17708 CU ALLOY

(CU(W) ALLOY)

L3 24 L1 AND (CU ALLOY)

=> s l2-l3

L4 51 (L2 OR L3)

=> s l4 and (Ni or nickel)

599025 NI

597416 NICKEL

L5 20 L4 AND (NI OR NICKEL)

=> d 15 1-20 ibib kwic

L5 ANSWER 1 OF 20 CAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2005:1176509 CAPLUS

DOCUMENT NUMBER: 143:424738

TITLE: Production of anodes for lithium batteries, its production apparatus, production of secondary lithium batteries, and produced anodes and batteries

INVENTOR(S): Miyaji, Masakazu; Morita, Shoji; Fujioka, Yuichi; Kobayashi, Katsuaki; Hashimoto, Tsutomu

PATENT ASSIGNEE(S): Mitsubishi Heavy Industries, Ltd., Japan

SOURCE: Jpn. Kokai Tokkyo Koho, 24 pp.

CODEN: JKXXAF

DOCUMENT TYPE: Patent

LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2005310476	A2	20051104	JP 2004-124172	20040420
			JP 2004-124172	20040420

PRIORITY APPLN. INFO.:

AB The anodes are produced by a process comprising steps of (1) carrying active mass particles by a carrier gas, and (2) high-speed spray coating the particles onto anode substrates. An apparatus for the production comprises a

sealed container, a means for exhausting the container, a substrate holder, a nozzle for spraying the particles toward the holder, an ejector for mixing the particles and carrier gas and for supplying the mixture to a nozzle, an spraying nozzle, a means for supplying the particles (from a hopper) to the ejector, and a means for supplying the carrier gas to the ejector. The particles may be made of crystalline, or noncryst. silicon (having elec. conductive substance coatings formed by CVD, sputtering, thermal spray coating, vacuum vapor deposition, or plating). Also claimed are **lithium battery** anodes made of fine polycrystals of silicon or copper-tin alloys. Alternatively, the polycrystal active mass are coated with the elec. conductive films. The anodes achieves high discharge capacity, high durability, and excellent charge-discharge cycling performance.

ST **lithium battery** anode prodn particle spray coating; silicon particle spray coating **lithium battery** anode; elec conductive coating silicon particle anode **lithium battery**; copper tin alloy particle spray coating **lithium battery** anode; spray coating app manuf **lithium battery** anode

IT Vapor deposition process  
(chemical, of conductors on anode active mass particles; production of Li battery anodes by spray coating (Si or Sn-Cu alloy) particles (coated with elec. conductors))

IT Sputtering  
(deposition, of conductors on anode active mass particles; production of Li battery anodes by spray coating (Si or Sn-Cu alloy) particles (coated with elec. conductors))

IT Secondary batteries  
(lithium; production of Li battery anodes by spray coating (Si or Sn-Cu alloy) particles (coated with elec. conductors))

IT Reduction  
(of oxidized anode active mass, in spray coating; production of Li battery anodes by spray coating (Si or Sn-Cu alloy) particles (coated with elec. conductors))

IT Coating process  
(plating, of conductors on anode active mass particles; production of Li

- battery anodes by spray coating (Si or Sn-Cu alloy) particles (coated with elec. conductors))
- IT Battery anodes  
(production of Li battery anodes by spray coating (Si or Sn-Cu alloy) particles (coated with elec. conductors))
- IT Coating apparatus  
Coating process  
(spray; production of Li battery anodes by spray coating (Si or Sn-Cu alloy) particles (coated with elec. conductors))
- IT Coating process  
(thermal spraying, of conductors on anode active mass particles; production of Li battery anodes by spray coating (Si or Sn-Cu alloy) particles (coated with elec. conductors))
- IT Vapor deposition process  
(vacuum, of conductors on anode active mass particles; production of Li battery anodes by spray coating (Si or Sn-Cu alloy) particles (coated with elec. conductors))
- IT 12597-68-1, Stainless steel, uses  
RL: DEV (Device component use); USES (Uses)  
(anode substrates; production of Li battery anodes by spray coating (Si or Sn-Cu alloy) particles (coated with elec. conductors))
- IT 7440-37-1, Argon, uses 7440-59-7, Helium, uses 7727-37-9, Nitrogen, uses  
RL: NUU (Other use, unclassified); USES (Uses)  
(carrier gas in spray coating; production of Li battery anodes by spray coating (Si or Sn-Cu alloy) particles (coated with elec. conductors))
- IT 7439-89-6, Iron, uses 7439-95-4, Magnesium, uses 7439-96-5, Manganese, uses 7440-02-0, **Nickel**, uses 7440-03-1, Niobium, uses 7440-32-6, Titanium, uses 7440-44-0, Carbon, uses 7440-47-3, Chromium, uses 7440-48-4, Cobalt, uses 7440-50-8, Copper, uses 7440-62-2, Vanadium, uses 7440-67-7, Zirconium, uses  
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process); USES (Uses)  
(elec. conductive coatings on (silicon) particles; production of Li battery anodes by spray coating (Si or Sn-Cu alloy) particles (coated with elec. conductors))
- IT 7440-21-3, Silicon, uses 12668-36-9  
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process); USES (Uses)  
(particles; production of Li battery anodes by spray coating (Si or Sn-Cu alloy) particles (coated with elec. conductors))
- IT 1333-74-0, Hydrogen, uses  
RL: NUU (Other use, unclassified); USES (Uses)  
(reducing agent, in carrier gas in spray coating; production of Li battery anodes by spray coating (Si or Sn-Cu alloy) particles (coated with elec. conductors))

L5 ANSWER 2 OF 20 CAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2005:1129822 CAPLUS

DOCUMENT NUMBER: 143:370086

TITLE: Production of secondary **lithium battery** electrodes by thin film deposition, and same electrodes

INVENTOR(S): Hirase, Masaki; Yagi, Hiromasa; Jito, Taizo; Sayama, Katsunobu

PATENT ASSIGNEE(S): Sanyo Electric Co., Ltd., Japan

SOURCE: Jpn. Kokai Tokkyo Koho, 13 pp.

CODEN: JKXXAF

DOCUMENT TYPE: Patent

LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 1

## PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2005293899	A2	20051020	JP 2004-103930	20040331
PRIORITY APPLN. INFO.:			JP 2004-103930	20040331
TI	Production of secondary <b>lithium battery</b> electrodes by thin film deposition, and same electrodes			
ST	<b>lithium battery</b> electrode prodn film vapor deposition; silicon vapor deposition <b>lithium battery</b> anode; ion implantation pretreatment <b>lithium battery</b> electrode vapor deposition			
IT	Secondary batteries (lithium; production of secondary <b>lithium battery</b> electrode by intermittent thin film deposition with ion implantation at some intervals)			
IT	Sputtering (of first film; production of secondary <b>lithium battery</b> electrode by intermittent thin film deposition with ion implantation at some intervals)			
IT	Vapor deposition process (of second- and thereafter films; production of secondary <b>lithium battery</b> electrode by intermittent thin film deposition with ion implantation at some intervals)			
IT	Battery anodes Battery electrodes Ion implantation (production of secondary <b>lithium battery</b> electrode by intermittent thin film deposition with ion implantation at some intervals)			
IT	<b>Copper alloy</b> , base RL: DEV (Device component use); USES (Uses) (current collector; production of secondary <b>lithium battery</b> electrode by intermittent thin film deposition with ion implantation at some intervals)			
IT	7440-21-3, Silicon, uses RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process); USES (Uses) (anode thin film; production of secondary <b>lithium battery</b> electrode by intermittent thin film deposition with ion implantation at some intervals)			
IT	7440-02-0, <b>Nickel</b> , uses 7440-50-8, Copper, uses 12597-68-1, Stainless steel, uses RL: DEV (Device component use); USES (Uses) (current collector; production of secondary <b>lithium battery</b> electrode by intermittent thin film deposition with ion implantation at some intervals)			
IT	7440-37-1, Argon, uses RL: NUU (Other use, unclassified); USES (Uses) (ion implantation of; production of secondary <b>lithium battery</b> electrode by intermittent thin film deposition with ion implantation at some intervals)			

L5 ANSWER 3 OF 20 CAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2005:563904 CAPLUS

DOCUMENT NUMBER: 143:100267

TITLE: Thin film electrode, its manufacture, and secondary **lithium battery** which uses the electrode film

INVENTOR(S): Kojima, Akimichi; Ueda, Atsushi; Aoyama, Shigeo

PATENT ASSIGNEE(S): Hitachi Maxell Ltd., Japan

SOURCE: Jpn. Kokai Tokkyo Koho, 16 pp.

CODEN: JKXXAF

DOCUMENT TYPE: Patent  
LANGUAGE: Japanese  
FAMILY ACC. NUM. COUNT: 1  
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2005174603	A2	20050630	JP 2003-409339	20031208

PRIORITY APPLN. INFO.: JP 2003-409339 20031208

TI Thin film electrode, its manufacture, and secondary **lithium battery** which uses the electrode film

AB The electrode is obtained by forming a thin film, containing a NiAs type Cu-Sn based intermetallic compound with space group P63/mmc, on a collector; where the thin film contains a metal element (excluding Sn) having m.p.  $\leq 700^\circ$ ; and the mass of the metal element is 0.1-20% of total mass of the metal element and Cu. The electrode is manufactured by forming a Sn or Sn alloy layer on a collector; forming a **Cu alloy** layer containing 0.1-20 mass% required metal element on the Sn or Sn alloy layer; and heating the coated collector at a temperature below m.p. of Sn. The battery uses the above electrode as an anode.

ST secondary **lithium battery** anode manuf Cu Sn intermetallic compd

IT 7440-02-0, **Nickel**, uses 7440-31-5, Tin, uses 7440-50-8, Copper, uses 11143-56-9 12019-69-1

RL: DEV (Device component use); USES (Uses)  
(manufacture of anodes containing Cu-Sn based intermetallic compds. for secondary lithium batteries)

L5 ANSWER 4 OF 20 CAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2005:429255 CAPLUS

DOCUMENT NUMBER: 142:466538

TITLE: Battery having metal terminal fixed to battery case

INVENTOR(S): Yoshida, Hiroaki; Miyanaga, Naozumi

PATENT ASSIGNEE(S): Japan Storage Battery Co., Ltd., Japan

SOURCE: U.S. Pat. Appl. Publ., 15 pp.  
CODEN: USXXCO

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 2005106455	A1	20050519	US 2004-956119	20041004

PRIORITY APPLN. INFO.: JP 2003-344981 A 20031002

IT Secondary batteries  
(**lithium; battery** having metal terminal fixed to battery case)

IT **Copper alloy**, base  
**Nickel** alloy, base

RL: TEM (Technical or engineered material use); USES (Uses)  
(battery having metal terminal fixed to battery case)

IT 7439-89-6, Iron, uses 7440-02-0, **Nickel**, uses 7440-50-8, Copper, uses 11101-78-3

RL: TEM (Technical or engineered material use); USES (Uses)  
(battery having metal terminal fixed to battery case)

L5 ANSWER 5 OF 20 CAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2005:155486 CAPLUS

DOCUMENT NUMBER: 142:243602

TITLE: Structure comprising a modified fluoropolymer and a battery electrodes consisting of the structure

INVENTOR(S): Bonnet, Anthony; Ramfel, Barbara; Barriere, Benoit;

Pascal, Thierry  
PATENT ASSIGNEE(S): Arkema, Fr.  
SOURCE: Eur. Pat. Appl., 11 pp.  
CODEN: EPXXDW  
DOCUMENT TYPE: Patent  
LANGUAGE: French  
FAMILY ACC. NUM. COUNT: 1  
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
EP 1508927	A2	20050223	EP 2004-291665	20040701
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, HU, PL, SK, HR				
JP 2005047275	A2	20050224	JP 2004-218575	20040727
CA 2475421	AA	20050129	CA 2004-2475421	20040728
US 2005069778	A1	20050331	US 2004-900817	20040728
PRIORITY APPLN. INFO.:			FR 2003-9298	A 20030729

ST modified fluoropolymer electrode secondary **lithium battery**

IT Aluminum alloy, base  
Chromium alloy, base  
**Copper alloy**, base  
Lead alloy, base  
**Nickel alloy**, base  
Silver alloy, base  
Titanium alloy, base

RL: TEM (Technical or engineered material use); USES (Uses)  
(collector in structure comprising (modified) fluoropolymers for battery electrodes)

IT 7429-90-5, Aluminum, uses 7439-92-1, Lead, uses 7440-02-0, **Nickel**, uses 7440-22-4, Silver, uses 7440-32-6, Titanium, uses 7440-47-3, Chromium, uses 7440-50-8, Copper, uses 12597-68-1, Stainless steel, uses 12597-69-2, Steel, uses

RL: TEM (Technical or engineered material use); USES (Uses)  
(collector in structure comprising (modified) fluoropolymers for battery electrodes)

L5 ANSWER 6 OF 20 CAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2004:632493 CAPLUS

DOCUMENT NUMBER: 141:176834

TITLE: Material for secondary **lithium battery** anode and its manufacture

INVENTOR(S): Hara, Toshihisa

PATENT ASSIGNEE(S): Kobe Steel, Ltd., Japan

SOURCE: Jpn. Kokai Tokkyo Koho, 15 pp.

CODEN: JKXXAF

DOCUMENT TYPE: Patent

LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2004220871	A2	20040805	JP 2003-5145	20030110
PRIORITY APPLN. INFO.:			JP 2003-5145	20030110

TI Material for secondary **lithium battery** anode and its manufacture

AB The title material has a surface plating layer, comprising successively a **Ni** layer, a Cu-Sn alloy layer, and a Sn layer, on a **Cu (alloy)** containing base material; where the Cu-Sn alloy layer consists of a  $\eta$  layer (Cu<sub>6</sub>Sn<sub>5</sub>) with a thickness of 5-100  $\mu$ m. The title material is manufactured by forming the **Ni** plating layer on the base

material; repeatedly forming successive layers of the Cu plating layer and the Sn plating layer  $\geq 1$  times; and heat treating to form the  $\eta$  layer (Cu<sub>6</sub>Sn<sub>5</sub>) containing Cu-Sn alloy layer.

ST secondary **lithium battery** anode manuf; battery anode  
copper tin alloy plated **Cu alloy**

IT 7440-02-0, **Nickel**, uses 7440-31-5, Tin, uses 7440-50-8,  
Copper, uses 11143-56-9 12019-69-1 12621-68-0 12668-36-9  
39398-44-2 73235-25-3 95079-63-3 110833-60-8 479352-43-7, Cobalt  
copper phosphide 587840-11-7 591767-70-3

RL: TEM (Technical or engineered material use); USES (Uses)  
(compsns. and manufacture of anode materials containing Cu-Sn plated Cu or Cu  
alloys for secondary lithium batteries)

L5 ANSWER 7 OF 20 CAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2004:180610 CAPLUS

DOCUMENT NUMBER: 140:202477

TITLE: Anode component for secondary **lithium  
battery** and its manufacture

INVENTOR(S): Anan, Junichi; Tamaki, Toshio; Ohashi, Takeo

PATENT ASSIGNEE(S): Nikko Materials Co., Ltd., Japan; Petoca Materials  
Ltd.; Japan Energy Corp.; Kashima Oil Co., Ltd.

SOURCE: Jpn. Kokai Tokkyo Koho, 7 pp.

CODEN: JKXXAF

DOCUMENT TYPE: Patent

LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
	JP 2004071463	A2	20040304	JP 2002-231593	20020808
PRIORITY APPLN. INFO.:				JP 2002-231593	20020808
TI	Anode component for secondary <b>lithium battery</b> and its manufacture				
AB	The anode component comprises a <b>Ni</b> or <b>Cu alloy</b> foil, containing 10-50 % Si; and is manufactured by supplying a melt of the <b>Ni</b> or <b>Cu alloy</b> to a rotary cooling roller to make a foil.				
ST	secondary <b>lithium battery</b> anode <b>nickel</b> silicon copper silicon alloy				
IT	Battery anodes (manufacture of anodes containing <b>Ni</b> or Cu alloys with controlled amount of silicon for secondary lithium batteries)				
IT	12645-64-6	37316-08-8	39315-06-5	62794-30-3	79933-53-2
	85384-33-4	96726-95-3	129827-29-8	135866-52-3	145108-85-6
	172173-79-4	217076-77-2			
RL:	DEV (Device component use); USES (Uses) (manufacture of anodes containing <b>Ni</b> or Cu alloys with controlled amount of silicon for secondary lithium batteries)				

L5 ANSWER 8 OF 20 CAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2003:834315 CAPLUS

DOCUMENT NUMBER: 139:310093

TITLE: Manufacture of secondary **lithium  
battery** electrodes having high  
charge-discharge cycle performance

INVENTOR(S): Yagi, Hiromasa; Tarui, Haruki

PATENT ASSIGNEE(S): Sanyo Electric Co., Ltd., Japan

SOURCE: Jpn. Kokai Tokkyo Koho, 10 pp.

CODEN: JKXXAF

DOCUMENT TYPE: Patent

LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 1

## PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2003303587	A2	20031024	JP 2002-108256	20020410
PRIORITY APPLN. INFO.:			JP 2002-108256	20020410
TI	Manufacture of secondary <b>lithium battery</b> electrodes having high charge-discharge cycle performance			
ST	<b>lithium battery</b> anode active mass sputter deposition; silicon interface <b>lithium battery</b> anode sputter deposition; radio frequency sputter deposition interface <b>lithium battery</b> anode; electrode <b>lithium battery</b> sputter deposition RF DC			
IT	Battery anodes Sputtering (manufacture of secondary <b>lithium battery</b> anodes containing interface layers and active mass layers by RF- and d.c. sputter deposition)			
IT	Battery electrodes (manufacture of secondary <b>lithium battery</b> electrodes containing interface layers and active mass layers by RF- and d.c. sputter deposition)			
IT	Sputtering (radio-frequency; manufacture of secondary <b>lithium battery</b> anodes containing interface layers and active mass layers by RF- and d.c. sputter deposition)			
IT	<b>Copper alloy</b> , base RL: DEV (Device component use); USES (Uses) (current collector; manufacture of secondary <b>lithium battery</b> anodes containing interface layers and active mass layers by RF- and d.c. sputter deposition)			
IT	7440-21-3, Silicon, uses RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process); USES (Uses) (amorphous, active material layer and boundary layer; manufacture of secondary <b>lithium battery</b> anodes containing interface layers and active mass layers by RF- and d.c. sputter deposition)			
IT	7440-02-0, <b>Nickel</b> , uses 7440-50-8, Copper, uses 12597-68-1, Stainless steel, uses RL: DEV (Device component use); USES (Uses) (current collector; manufacture of secondary <b>lithium battery</b> anodes containing interface layers and active mass layers by RF- and d.c. sputter deposition)			

L5 ANSWER 9 OF 20 CAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2002:827871 CAPLUS

DOCUMENT NUMBER: 137:313563

TITLE: Anode and its use in secondary **lithium battery**

INVENTOR(S): Okamoto, Takashi; Fujimoto, Hiroyuki; Fujiwara, Toyoki; Iyori, Masahiro; Kamino, Maruo

PATENT ASSIGNEE(S): Sanyo Electric Co., Ltd., Japan

SOURCE: Jpn. Kokai Tokkyo Koho, 6 pp.

CODEN: JKXXAF

DOCUMENT TYPE: Patent

LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 3

## PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2002319408	A2	20021031	JP 2001-124509	20010423
US 2003027050	A1	20030206	US 2002-124712	20020418



PRIORITY APPLN. INFO.: JP 2001-121172 A 20010419  
JP 2001-124509 A 20010423

TI Anode and its use in secondary **lithium battery**  
ST **lithium battery** anode collector foil copper coating  
IT **Copper alloy**, base  
RL: DEV (Device component use); USES (Uses)  
(collector foil and coatings; anode having collector coated with granular and dense Cu layers for Li battery with good cycle performance)  
IT Iron alloy, base  
**Nickel** alloy, base  
RL: DEV (Device component use); USES (Uses)  
(foil, collector substrate; anode having collector coated with granular and dense Cu layers for Li battery with good cycle performance)  
IT 7439-89-6, Iron, uses 7439-98-7, Molybdenum, uses 7440-02-0, **Nickel**, uses 7440-25-7, Tantalum, uses 7440-33-7, Tungsten, uses 12597-68-1, Stainless steel, uses  
RL: DEV (Device component use); USES (Uses)  
(foil, collector substrate; anode having collector coated with granular and dense Cu layers for Li battery with good cycle performance)

L5 ANSWER 10 OF 20 CAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2002:827870 CAPLUS

DOCUMENT NUMBER: 137:313562

TITLE: Anode and its use in secondary **lithium battery**

INVENTOR(S): Fujiwara, Toyoki; Okamoto, Takashi; Fujimoto, Hiroyuki; Iyori, Masahiro; Kamino, Maruo

PATENT ASSIGNEE(S): Sanyo Electric Co., Ltd., Japan

SOURCE: Jpn. Kokai Tokkyo Koho, 8 pp.

CODEN: JKXXAF

DOCUMENT TYPE: Patent

LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2002319407	A2	20021031	JP 2001-124508	20010423
PRIORITY APPLN. INFO.:			JP 2001-124508	20010423

TI Anode and its use in secondary **lithium battery**  
ST **lithium battery** anode collector foil surface treatment; chromium rust preventive layer foil anode battery; silane coupling agent foil anode battery  
IT **Copper alloy**, base  
Iron alloy, base  
**Nickel** alloy, base  
RL: DEV (Device component use); USES (Uses)  
(foil, collector substrate; anode having surface-treated collector for Li battery with good cycle performance)  
IT 7439-89-6, Iron, uses 7439-98-7, Molybdenum, uses 7440-02-0, **Nickel**, uses 7440-25-7, Tantalum, uses 7440-33-7, Tungsten, uses 7440-50-8, Copper, uses 12597-68-1, Stainless steel, uses  
RL: DEV (Device component use); USES (Uses)  
(foil, collector substrate; anode having surface-treated collector for Li battery with good cycle performance)

L5 ANSWER 11 OF 20 CAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2002:752543 CAPLUS

DOCUMENT NUMBER: 137:250329

TITLE: Manufacture of lithium secondary battery electrodes by application of active material layers on collectors

INVENTOR(S): Yagi, Hiromasa; Tarui, Hisaki

PATENT ASSIGNEE(S): Sanyo Electric Co., Ltd., Japan  
 SOURCE: Jpn. Kokai Tokkyo Koho, 8 pp.  
 CODEN: JKXXAF  
 DOCUMENT TYPE: Patent  
 LANGUAGE: Japanese  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2002289181	A2	20021004	JP 2001-93065	20010328
US 2003038024	A1	20030227	US 2002-106205	20020327
US 6649033	B2	20031118		

PRIORITY APPLN. INFO.: JP 2001-93065 A 20010328

AB The electrode is manufactured by sputter formation of an interlayer on a collector followed by vapor deposition of an active material layer on the interlayer. The interlayer and/or the active material layer may contain Si. Preferably, the collector may be selected from Cu (alloys), Ni, and stainless steel, or their laminates. The electrodes have high strength and the batteries have excellent cycle characteristics. '

ST secondary **lithium battery** electrode coating manuf;  
 sputtering interlayer battery anode coating; vapor deposition active material battery anode

IT Secondary batteries  
 (lithium; sputter formation of interlayers on collectors in vapor deposition of active material layers for preparation of secondary **lithium battery** electrodes)

IT Battery anodes  
 Sputtering  
 Vapor deposition process  
 (sputter formation of interlayers on collectors in vapor deposition of active material layers for preparation of secondary **lithium battery** electrodes)

IT **Copper alloy**, base  
 RL: PEP (Physical, engineering or chemical process); PYP (Physical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)  
 (collector; sputter formation of interlayers on collectors in vapor deposition of active material layers for preparation of secondary **lithium battery** electrodes)

IT 7440-50-8, Copper, uses  
 RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process); USES (Uses)  
 (collector; sputter formation of interlayers on collectors in vapor deposition of active material layers for preparation of secondary **lithium battery** electrodes)

IT 7440-02-0, **Nickel**, uses 12597-68-1, Stainless steel, uses  
 RL: PEP (Physical, engineering or chemical process); PYP (Physical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)  
 (collector; sputter formation of interlayers on collectors in vapor deposition of active material layers for preparation of secondary **lithium battery** electrodes)

IT 7440-21-3, Silicon, uses  
 RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process); USES (Uses)  
 (sputter formation of interlayers on collectors in vapor deposition of active material layers for preparation of secondary **lithium battery** electrodes)

L5 ANSWER 12 OF 20 CAPLUS COPYRIGHT 2006 ACS on STN  
 ACCESSION NUMBER: 2002:555814 CAPLUS  
 DOCUMENT NUMBER: 137:111730

TITLE: Electrode for an electrochemical arrangement  
 INVENTOR(S): Maly-Schreiber, Martha; Whitehead, Adam  
 PATENT ASSIGNEE(S): Funktionswerkstoffe Forschungs- U. Entwicklungs GmbH,  
 Austria  
 SOURCE: PCT Int. Appl., 16 pp.  
 CODEN: PIXXD2  
 DOCUMENT TYPE: Patent  
 LANGUAGE: German  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2002058172	A2	20020725	WO 2002-AT15	20020116
WO 2002058172	A3	20021121		
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG				
AT 200100094	A5	20021215	AT 2001-94	20010119
AT 410860	B	20030825		

PRIORITY APPLN. INFO.: AT 2001-94 A 20010119

ST electrode **lithium battery**; capacitor lithium electrode

IT Aluminum alloy, base

Chromium alloy, base

**Copper alloy**, base

Gold alloy, base

Iron alloy, base

Manganese alloy, base

**Nickel alloy**, base

Silver alloy, base

Titanium alloy, base

RL: TEM (Technical or engineered material use); USES (Uses)

(coating on polymeric fibers in elec. conducting web support for  
battery or capacitor electrodes)

IT 7429-90-5, Aluminum, uses 7439-89-6, Iron, uses 7439-96-5, Manganese,  
uses 7440-02-0, **Nickel**, uses 7440-22-4, Silver, uses

7440-32-6, Titanium, uses 7440-47-3, Chromium, uses 7440-50-8, Copper,  
uses 7440-57-5, Gold, uses 12597-68-1, Stainless steel, uses

RL: TEM (Technical or engineered material use); USES (Uses)

(coating on polymeric fibers in elec. conducting web support for  
battery or capacitor electrodes)

L5 ANSWER 13 OF 20 CAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2000:534515 CAPLUS

DOCUMENT NUMBER: 133:137859

TITLE: Secondary lithium batteries

INVENTOR(S): Woo, Il Ki; Lee, Sang Won; Park, Jyun Joon; Roh, Young  
Bae; Kim, Kwon Sik

PATENT ASSIGNEE(S): Samsung Sdi Co., Ltd., S. Korea

SOURCE: Jpn. Kokai Tokkyo Koho, 3 pp.

CODEN: JKXXAF

DOCUMENT TYPE: Patent

LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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JP 2000215897	A2	20000804	JP 2000-15478	20000125
KR 2000052362	A	20000825	KR 1999-51148	19991117
US 2002192554	A1	20021219	US 2000-494211	20000125
PRIORITY APPLN. INFO.:			KR 1999-2257	A 19990125
			KR 1999-51148	A 19991117

AB The batteries have a cathode containing Li metal oxide applied on a substrate, an anode containing a carbonaceous material or SnO<sub>2</sub> applied on a substrate, and a separator between the electrodes; where the anode substrate is a ≤20 μm thick Cu based alloy foil containing Ni, Ti, Mg, Sn, Zn, b, Cr, Mn, Si, Co, Fe, V, Al, Zr, Nb, P, Bi, Pb, Ag, and/or misch metal.

ST **lithium battery** anode substrate **copper alloy** foil

L5 ANSWER 14 OF 20 CAPLUS COPYRIGHT 2006 ACS on STN  
 ACCESSION NUMBER: 2000:313659 CAPLUS  
 DOCUMENT NUMBER: 132:310846  
 TITLE: Anode collectors for secondary batteries  
 INVENTOR(S): Ashizawa, Kimikazu; Eguchi, Tatsuo  
 PATENT ASSIGNEE(S): Nippaku Sangyo K. K., Japan; Nippon Foil Mfg. Co., Ltd.  
 SOURCE: Jpn. Kokai Tokkyo Koho, 5 pp.  
 CODEN: JKXXAF  
 DOCUMENT TYPE: Patent  
 LANGUAGE: Japanese  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2000133276	A2	20000512	JP 1998-298772	19981020
JP 3649373	B2	20050518		
PRIORITY APPLN. INFO.:			JP 1998-298772	19981020

AB The anode collectors are foils of alloys containing Zn 5-40, total of Ni, Fe, and Ti 0-50, impurities ≤0.01%, and balance Cu. The batteries are Li batteries.

ST **secondary lithium battery** anode **copper alloy** collector

IT Battery anodes

(compns. of **copper alloy** foils for anode collectors for secondary lithium batteries)

IT 11134-30-8 11134-31-9 12645-94-2 150449-61-9 265323-43-1  
 265323-44-2

RL: DEV (Device component use); USES (Uses)

(compns. of **copper alloy** foils for anode collectors for secondary lithium batteries)

L5 ANSWER 15 OF 20 CAPLUS COPYRIGHT 2006 ACS on STN  
 ACCESSION NUMBER: 1999:783383 CAPLUS  
 DOCUMENT NUMBER: 132:13890  
 TITLE: **Copper alloy** foil collectors for secondary batteries  
 INVENTOR(S): Takagi, Junichi; Eguchi, Tatsuo  
 PATENT ASSIGNEE(S): Nippaku Sangyo K. K., Japan; Nippon Foil Mfg. Co., Ltd.  
 SOURCE: Jpn. Kokai Tokkyo Koho, 4 pp.  
 CODEN: JKXXAF  
 DOCUMENT TYPE: Patent  
 LANGUAGE: Japanese  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

(e)

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
✓ JP 11339811	A2	19991210	JP 1998-142575	19980525
PRIORITY APPLN. INFO.:			JP 1998-142575	19980525
TI	<b>Copper alloy</b> foil collectors for secondary batteries			
AB	The collectors are foils of <del>Cu</del> alloys containing Cu ≥95% and Fe, Ni, Cr, P, Sn, and/or Zn 0.01-5%. The collectors are 8-25 μm thick, have tensile strength ≥500 N/mm <sup>2</sup> , and are preferably for carbonaceous anodes in secondary lithium batteries.			
ST	secondary <b>lithium battery</b> carbonaceous anode collector; <b>copper alloy</b> collector carbonaceous anode <b>lithium battery</b>			
IT	Battery anodes ( <b>copper alloy</b> foil collectors for carbonaceous anodes in secondary lithium batteries)			
IT	Carbonaceous materials (technological products) RL: DEV (Device component use); USES (Uses) ( <b>copper alloy</b> foil collectors for carbonaceous anodes in secondary lithium batteries)			
IT	11105-46-7 69523-73-5 132081-49-3 RL: DEV (Device component use); USES (Uses) ( <b>copper alloy</b> foil collectors for carbonaceous anodes in secondary lithium batteries)			
IT	7439-89-6, Iron, uses 7440-02-0, <b>Nickel</b> , uses 7440-31-5, Tin, uses 7440-47-3, Chromium, uses 7440-66-6, Zinc, uses 7723-14-0, Phosphorus, uses RL: MOA (Modifier or additive use); USES (Uses) (microalloying components in <b>copper alloy</b> foil collectors for carbonaceous anodes in secondary lithium batteries)			

L5 ANSWER 16 OF 20 CAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 1998:782091 CAPLUS

DOCUMENT NUMBER: 130:40971

TITLE: Disulfide composite cathodes and secondary lithium batteries using them

INVENTOR(S): Kim, Hyun-Jung; Sung, Hyun-kyung; Lee, Kwan-Young

PATENT ASSIGNEE(S): Kumho Petrochemical Co., Ltd., Japan

SOURCE: Jpn. Kokai Tokkyo Koho, 8 pp.  
CODEN: JKXXAF

DOCUMENT TYPE: Patent

LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 10321217	A2	19981204	JP 1998-97391	19980409
JP 2936097	B2	19990823		
US 6057056	A	20000502	US 1998-58149	19980410
PRIORITY APPLN. INFO.:			KR 1997-14883	A 19970422
			KR 1997-41365	A 19970827
			KR 1997-47046	A 19970912
ST	transition metal disulfide composite cathode; conducting polymer disulfide composite cathode; copper current collector composite cathode; disulfide composite cathode <b>lithium battery</b>			
IT	<b>Copper alloy</b> RL: DEV (Device component use); USES (Uses) (current collector; composite cathodes containing disulfide compds., transition metals, and conductive substances for lithium batteries)			
IT	638-16-4, Trithiocyanuric acid 1072-71-5, 2,5-Dimercapto-1,3,4-thiadiazole 7439-89-6, Iron, uses 7439-93-2D, Lithium, polymer complexes, electrolytes, uses 7439-96-5, Manganese, uses 7439-98-7, Molybdenum, uses 7440-02-0, <b>Nickel</b> , uses 7440-16-6, Rhodium,			

uses 7440-18-8, Ruthenium, uses 7440-20-2, Scandium, uses 7440-32-6, Titanium, uses 7440-33-7, Tungsten, uses 7440-44-0, Carbon, uses 7440-47-3, Chromium, uses 7440-48-4, Cobalt, uses 7440-62-2, Vanadium, uses 7440-66-6, Zinc, uses 7782-42-5, Graphite, uses 24968-79-4D, Acrylonitrile-methyl acrylate copolymer, lithium complexes, electrolytes 25233-30-1, Polyaniline 25233-34-5, Polythiophene 30604-81-0, Polypyrrole  
 RL: DEV (Device component use); USES (Uses)  
 (composite cathodes containing disulfide compds., transition metals, and conductive substances for lithium batteries)

L5 ANSWER 17 OF 20 CAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 1998:742747 CAPLUS  
 DOCUMENT NUMBER: 130:54858  
 TITLE: Nonaqueous lithium secondary batteries  
 INVENTOR(S): Tanaka, Noriko; Kawamura, Yumiko; Fujii, Takafumi  
 PATENT ASSIGNEE(S): Matsushita Battery Industrial Co., Ltd., Japan  
 SOURCE: Jpn. Kokai Tokkyo Koho, 5 pp.  
 CODEN: JKXXAF  
 DOCUMENT TYPE: Patent  
 LANGUAGE: Japanese  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
✓ JP 10308207	A2	19981117	JP 1997-117820	19970508
PRIORITY APPLN. INFO.:			JP 1997-117820	19970508

AB The anodes of the batteries comprise Li-intercalatable C material powder and powders of alloys of metals that alloy with Li and metals that do not alloy with Li. The metals that alloy with Li may be Sn, Si, In, Bi, Al, Ga, and/or Ag and those that do not alloy with Li may be Cu and/or Ni. Preferably, the alloys are Sn-Cu or Si-Cu alloys. The batteries have long cycle lifetime due to prevention of degradation of anodes and decrease of irreversible capacity.

ST nonaq lithium secondary battery anode; tin copper alloy  
 lithium battery anode; silicon copper alloy lithium battery anode

IT Battery anodes  
 (carbon materials and alloys for nonaq. secondary lithium battery anodes)

IT 7782-42-5, Graphite, uses 12645-63-5 12682-90-5 12682-92-7  
 39451-99-5 55918-93-9 58615-15-9 60225-00-5 62186-40-7  
 67054-71-1 84444-80-4 96726-95-3 129827-29-8 207685-67-4  
 217076-77-2

RL: DEV (Device component use); USES (Uses)  
 (carbon materials and alloys for nonaq. secondary lithium battery anodes)

L5 ANSWER 18 OF 20 CAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 1997:505241 CAPLUS  
 DOCUMENT NUMBER: 127:193062  
 TITLE: Sealed batteries with improved safety structure and their manufacture  
 INVENTOR(S): Watanabe, Shunji; Sakai, Tsugio; Tawara, Kensuke; Senda, Hiroshi; Onodera, Hideharu  
 PATENT ASSIGNEE(S): Seiko Instruments, Inc., Japan  
 SOURCE: Jpn. Kokai Tokkyo Koho, 9 pp.  
 CODEN: JKXXAF  
 DOCUMENT TYPE: Patent  
 LANGUAGE: Japanese  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 09199088	A2	19970731	JP 1996-4283	19960112
PRIORITY APPLN. INFO.:			JP 1996-4283	19960112
AB	The sealed batteries have $\geq 1$ holes formed on the battery case or cover and a safety device welded on the case or cover, whereas the safety device has a thin metal plate closing the hole(s) and breakable by the internal pressure of the battery, and a metal foil not larger than the plate and having $\geq 1$ holes. The metal foil is stainless steel, <b>Ni</b> , <b>Ni</b> alloy, <b>Al</b> , <b>Al</b> alloy, <b>Cu</b> , or <b>Cu</b> alloy. The batteries are manufactured by laying a metal plate on the hole(s) on the battery case or cover and welding a metal foil having hole(s) by using laser beam to the metal plate and simultaneous welding the plate to the battery case or cover. The batteries are preferably secondary Li batteries.			
ST	sealed <b>lithium battery</b> safety device manuf			
IT	aluminum alloy <b>copper alloy</b> <b>nickel</b> alloy			
	RL: DEV (Device component use); USES (Uses) (safety devices for secondary lithium batteries)			
IT	7429-90-5, Aluminum, uses 7440-02-0, <b>Nickel</b> , uses 7440-50-8, Copper, uses 12597-68-1, Stainless steel, uses			
	RL: DEV (Device component use); USES (Uses) (safety devices for secondary lithium batteries)			

L5 ANSWER 19 OF 20 CAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 1994:275401 CAPLUS

DOCUMENT NUMBER: 120:275401

TITLE: Lithium batteries with multilayer polymeric electrolyte and electrical contacts for thin-layer battery anodes

INVENTOR(S): Gauthier, Michel; Belanger, Andre; Jacobs, James K.

PATENT ASSIGNEE(S): Ricard, Serge, Can.; St-Amant, Guy

SOURCE: Can. Pat. Appl., 52 pp.  
CODEN: CPXXEB

DOCUMENT TYPE: Patent

LANGUAGE: French

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
CA 2068290	AA	19931109	CA 1992-2068290	19920508
CA 2068290	C	19990713		
JP 06068865	A2	19940311	JP 1993-106778	19930507
PRIORITY APPLN. INFO.:			CA 1992-2068290	A 19920508
AB	The anode film in the title batteries and extending laterally beyond the cathode and its collector comprises a rigid metallic coating compatible with Li, e.g., <b>Cu</b> , <b>Ni</b> , <b>Fe</b> , or their alloys, which is not in elec. contact with the other components of the battery and constitutes its external terminal. The batteries, consist of a plastic insulator, a Li anode, a polymeric electrolyte, a cathode, and a metallic collector, or a cathode, a polymeric electrolyte, a Li anode, a polymeric electrolyte, and a cathode.			
ST	electrolyte multilayer <b>lithium battery</b>			
IT	<b>copper alloy</b> , base iron alloy, base <b>nickel</b> alloy, base			
	RL: DEV (Device component use); USES (Uses) (elec. contacts, for lithium anodes in multilayer polymeric-electrolyte batteries)			

IT 7439-89-6, Iron, uses 7440-02-0, **Nickel**, uses 7440-50-8,  
Copper, uses  
RL: USES (Uses)  
(elec. contacts, for lithium anodes in multilayer polymeric-electrolyte  
batteries)

L5 ANSWER 20 OF 20 CAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 1994:11760 CAPLUS

DOCUMENT NUMBER: 120:11760

TITLE: Manufacture of thin-film current collectors for  
titanium sulfide cathodes for lithium batteries

INVENTOR(S): Gauthier, Michel; St-Amant, Guy; Vassort, Guy

PATENT ASSIGNEE(S): Hydro-Quebec, Can.

SOURCE: Eur. Pat. Appl., 20 pp.

CODEN: EPXXDW

DOCUMENT TYPE: Patent

LANGUAGE: French

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
EP 533576	A1	19930324	EP 1992-402562	19920917
EP 533576	B1	19970820		
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LI, LU, MC, NL, PT, SE				
CA 2051611	AA	19930318	CA 1991-2051611	19910917
CA 2051611	C	19960123		
JP 06243877	A2	19940902	JP 1992-248279	19920917
JP 3399561	B2	20030421		
US 5423110	A	19950613	US 1992-945899	19920917
AT 157201	E	19970915	AT 1992-402562	19920917
US 5521028	A	19960528	US 1995-418472	19950407
PRIORITY APPLN. INFO.:			CA 1991-2051611	A 19910917
			US 1992-945899	A3 19920917

AB A current collector is prepared by vacuum metalization of a nonconductive polymer substrate to obtain an elec. conductive layer 0.005-0.1  $\mu$ m thick and subsequent electroplating with  $\geq 1$  metal to obtain a layer 0.1-4  $\mu$ m thick. Then, the collector surface is coated or partially coated to obtain a collector-electrode assembly. Typically, the polymer substrate is polypropylene, polyester, polysulfone, or polyethylene. Metalization is done with Cu, **Ni**, Fe, Mo, Cr, C, Zn, Ag, Au or their alloys to obtain a surface elec. resistance of 0.1-10  $\Omega$ /square. Electroplating is done with **Ni**, Fe, Cr, Mo, or their alloys.

ST cathode current collector metal polymer; titanium sulfide cathode current collector; **lithium battery** titanium sulfide cathode

IT chromium alloy, base

**copper alloy**, base

gold alloy, base

iron alloy, base

molybdenum alloy, base

**nickel** alloy, base

silver alloy, base

zirconium alloy, base

RL: DEV (Device component use); USES (Uses)

(polymer current collectors coated with, for titanium sulfide cathodes in lithium batteries)

IT 7439-89-6, Iron, uses 7439-98-7, Molybdenum, uses 7440-02-0,

**Nickel**, uses 7440-22-4, Silver, uses 7440-44-0, Carbon, uses

7440-47-3, Chromium, uses 7440-50-8, Copper, uses 7440-57-5, Gold,

uses 7440-66-6, Zinc, uses

RL: USES (Uses)

(polymer current collectors coated with, for titanium sulfide cathodes



in lithium batteries)